

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTONA NEW SPECIES OF *ELEUTHERODACTYLUS*
(AMPHIBIA: LEPTODACTYLIDAE) FROM THE
PACIFIC LOWLANDS OF ECUADOR

BY JOHN D. LYNCH

School of Life Sciences, The University of Nebraska, Lincoln

Soon after my description of *Eleutherodactylus croceoinguinis* (Lynch, 1968) from Provincia Napo, Ecuador, Dr. Charles F. Walker called my attention to a series of a diminutive eleutherodactyline frog that he had collected in 1962 in the vicinity of Santo Domingo de los Colorados, Prov. Pichincha, Ecuador. His frogs were superficially similar to *E. croceoinguinis* in size (less than 25 mm SVL) and color pattern (presence of bright color patches on the concealed surfaces of the limbs). At that time I had not done field work in western Ecuador but had seen two examples of this frog collected along the Rio Baba. Field work in 1968 and 1970 provided me the opportunity to collect additional material at Santo Domingo de los Colorados as well as at several other localities in western Ecuador and to make ecological observations of this frog which is here named

Eleutherodactylus walkeri, new species

Holotype: The University of Kansas Museum of Natural History (KU) 131652, an adult male collected at Las Palmas (junction of highways 28 and 30), Prov. Pichincha, Ecuador, 920 m, 8 August 1970 by J. D. Lynch.

Paratypes: KU 131653-63, California Academy of Sciences 134064-66, collected syntopically with holotype; University of Michigan Museum of Zoology 131675 (10 specimens), Hacienda Delta, ca. 8 km SE Santo Domingo de los Colorados, Prov. Pichincha, Ecuador.

Diagnosis: (1) skin of dorsum finely shagreened, no dorsolateral folds, that of venter coarsely areolate, discoidal folds prominent; (2)

tympanum visible externally, its length one-third eye length; (3) snout subacuminate in dorsal view, rounded in lateral profile; (4) upper eyelid slightly narrower than interorbital distance (IOD); no cranial crests; (5) prevomerine odontophores oval, bearing teeth; (6) males with vocal slits and median subgular vocal sac; (7) first finger shorter than second, digits bearing discs on large, non-emarginate pads, discs wider than long; subarticular tubercles simple; (8) fingers bearing weak, keel-like lateral fringes; (9) ulnar tubercles obscure or lacking; (10) inner tarsal tubercle minute, outer edge of tarsus with faint tubercles; no heel tubercles; (11) inner metatarsal tubercle oval, length 2-3 times width, 5-6 times size of conical outer metatarsal tubercle; plantar surfaces bearing 0-3 supernumerary tubercles; (12) toes bearing weakly defined lateral fringes, not basally webbed; digits bearing discs and pads, pads slightly smaller than those of fingers; (13) color pattern polymorphic; most common pattern is: dorsum gray to brown with dark brown markings; limbs barred; venter cream with brown flecking; posterior surface of thighs pale to medium brown, sometimes with black patches enclosing cream spots; groin black with large cream (yellow in life) spots; (14) adults small, males 15.3-17.9 mm, females 20.8-25.3 mm SVL.

E. walkeri is the only small South American eleutherodactyline frog now known having visible tympana and yellow spotting on a black or dark brown field in the groin. *E. carvalhoi* Lutz and *E. croceinguinis* are superficially similar frogs but have concealed tympana.

Description: Statements listed in the diagnosis are not repeated below unless additional information is provided. Head about as wide as body or slightly wider than body; head longer than wide; head width 33.7-37.6 percent SVL ($\bar{x} = 35.6$); tip of snout extending beyond lower jaw; snout short, eye-nostril distance slightly less than eye length; canthus rostralis moderately sharp, slightly concave or straight; loreal region concave, sloping abruptly to lip; lips not flared; nostrils directed laterally, protuberant; interorbital space flat; frontoparietals complete, not produced laterally into crests; upper eyelid width 74.5-100.0 percent IOD ($\bar{x} = 87.2$); tympanum visible, its upper third usually concealed by supratympanic fold; tympanum round, its length 24.1-34.7 percent eye length ($\bar{x} = 31.3$), not sexually dimorphic in size or shape, separated from eye by distance equal to tympanic diameter; tongue large, longer than wide, weakly notched or entire along posterior border, posterior two-fifths to one-third not adherent to floor of mouth; choanae large, round, not concealed by palatal shelf of maxillae; prevomerine teeth present on small (one-third size of a choana), low, odontophores lying medial and posterior to choanae; 2-3 teeth per odontophore, arranged in a row (or clump) across posterior edge of odontophore.

Skin of dorsum, upper flanks, and limbs smooth to finely shagreened, that of lower flanks and venter coarsely areolate; shank of males 52.1-

54.4 percent SVL ($\bar{x} = 53.1$), of females 44.9–57.0 percent ($\bar{x} = 49.7$); forearm lacking prominent ulnar fringe or tubercles, no antebrachial tubercle; palmar tubercle bifid, larger than oval thenar tubercle; palm bearing a few supernumerary tubercles; subarticular tubercles subconical, round; all fingers bearing discs on simple pads; pad of thumb only slightly wider than digit, pads on fingers 2–4 nearly twice width of digit below pad.

Heel lacking tubercles in most individuals; when heel tubercles present, small and non-conical; most individuals have a minute inner tarsal tubercle and a series of small outer tarsal tubercles but a few individuals lack tarsal tubercles (possibly due to preservative); toe pads wider than long but less than twice width of digit below pad; pads of toes 3–5 largest; all toe pads smaller than finger pads (2–4) but larger than thumb pad.

Preserved color pattern: Gray to brown dorsally, pale cream (with indefinite infuscation on throat) to dark gray ventrally; labial bars, canthal and supratympanic stripes, interorbital bar, scapular and sacral chevrons, and lumbar bar dark brown (Fig. 1); limbs with oblique dark brown bars separated by broader, paler interspaces; anal triangle dark brown to black, contiguous with dark brown posterior surfaces of thighs; posterior surfaces of thighs with or without black-ringed cream spots (spots occur in 5 percent of specimens from Las Palmas and vicinity of Santo Domingo de los Colorados, Prov. Pichincha, and in 65 percent of specimens from Balzapamba, Prov. Bolivar); groin and anterior surfaces of thighs dark brown to black with colorless spots; concealed shank brown with cream spots.

E. walkeri exhibits pattern polymorphism (Fig. 2). Three pattern morphs are clearly evident (A–C), whereas a fourth (D) may not be distinct from the most common morph (A). The morphs are as follows:

- Morph A. Pattern of interorbital bar, scapular and sacral chevrons, and lumbar bar; flanks and side of head not darker than dorsum and top of head. (Fig. 1).
- Morph B. Flanks and side of head much darker than dorsum and top of head; dark vertebral stripe from tip of snout to vent bordered by paravertebral dark stripes. No chevrons or bars present.
- Morph C. As in A except for fine, cream, dark-brown-edged vertebral stripe passing through chevrons and bars.
- Morph D. As in A except for broad, pale cream, dorsolateral stripes; chevrons and bars occur between dorsolateral stripes.

At three localities, samples are adequate to compute frequencies of the morphs. Morph A is the most common at each locality (Santo Domingo de los Colorados and vicinity—86.4%; Las Palmas—93.3%; and Balzapamba—76.9%). The frequencies at the three localities are as follows (data given as numbers of A:B:C:D): Santo Domingo de los Colorados



FIG. 1. *Eleutherodactylus walkeri* new species (KU 120230).

and vicinity—19:0:1:2; Las Palmas—14:1:0:0; and Balzapamba—30:5:3:1.

Color in life: Gray, brown, rusty-brown, or black with black or dark brown markings; dorsal surfaces irregularly flecked with cream; venter dark gray to dull black with pale gray flecking; groin and anterior and posterior surfaces of thighs (latter variable with respect to spotting) dark brown to black with lemon yellow spots; iris chocolate-brown reticulated with black or gray-bronze above, brown below; dark brown horizontal streak through eye.

Natural history: All specimens collected were found in forested or forest-analogue habitats. Perhaps due to its small size, *E. walkeri* has not been found on the forest floor but has been found on herbs 10–30 cm above the ground. One individual was taken at night about 2.5 m above the forest floor on an elephant-ear plant. The specimens from Las Palmas were found on sticks and ferns in the spray zone of a small waterfall (ca. 6–7 m in height) where the vegetation was constantly buffeted by wind and spray. At Balzapamba, all but two individuals were collected by day in the cut-off stumps of banana plants. Walker found males calling both by day and night and described the call as “a weak, single-syllabled ‘tink’, quite *Acris*-like in quality.”

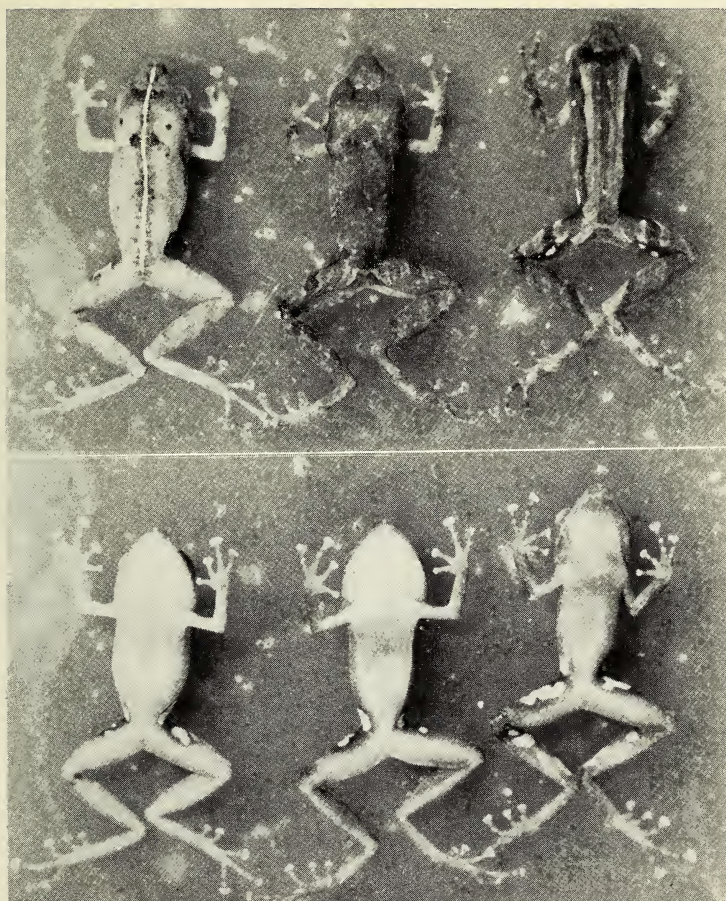


FIG. 2. Color pattern morphs of *Eleutherodactylus walkeri* new species. Top row, left to right, KU 120221 (morph C), 120215 (morph A), and 131628 (morph B). Lower row, left to right, KU 120221, 120215, 131628.

The only evidences of breeding were calling males (11 August 1962; 4 August 1968) at Hacienda Delta and Santo Domingo de los Colorados and an amplexic pair (KU 131652-53) at the type-locality (8 August 1970). The female of the pair (KU 131653) is the largest specimen examined (25.3 mm SVL) and has large, yellow ovarian eggs.

The known altitudinal range for *E. walkeri* is 220 m (Estacion Biologica Rio Palenque) to 1270 m (ESE of Balzapamba). Collections made on the Pacific slopes of the Andes at Tandapi, Prov. Pichincha

(1450 m), Apuela, Prov. Imbabura (1650 m), Guaranda, Prov. Bolivar (2500 m), and La Esperanza, Prov. Cotopaxi (1500 m), include several eleutherodactyline species but not *E. walkeri*; these localities are possibly too high for *E. walkeri*. The leptodactylid sympatrans of *E. walkeri* include two largely terrestrial species, *Barycholos pulcher* (diurnal) and *E. achatinus* (nocturnal), and several arboreal species (all nocturnal) including *E. areolatus*, *E. latidiscus*, and *E. ornatissimus* among the named forms. Of these, only *E. achatinus* occurs at elevations above 1270 m (found at Tandapi).

Measurements of the holotype in mm: SVL 17.9; tibia 9.4; head width 6.4; head length 6.6; upper eyelid width 1.6; IOD 2.1; tympanum length 0.8; eye length 2.5.

Etymology: Named for Charles F. Walker.

Other specimens examined: In addition to the type-material, the following have been examined. ECUADOR, *Prov. Bolivar:* Balzapamba, 800 m, KU 131613-51; 6 km ESE Balzapamba, 1270 m, KU 142039-40. *Prov. Cotopaxi:* 20.3 km W Pilalo, 830 m, KU 142034-38. *Prov. El Oro:* 32.6 km SSE Portovelo, 990 m, KU 142041. *Prov. Los Rios:* Estacion Biologica Rio Palenque, 56 km N Quevedo, 220 m, KU 147567-68. *Prov. Pichincha:* 3 km E Dos Rios, 1050 m, KU 142033; 3.7 km E Dos Rios, 1190 m, KU 142031-32; Rio Baba, 4 km E, 10 km S Santo Domingo de los Colorados, Univ. Illinois Mus. Nat. History 93560-61; Santo Domingo de los Colorados (vicinity of Hotel Zaracay), 660 m, KU 120215-21, 120227-31.

Remarks: Few species of Cochran and Goin's (1970) Group II (skin of venter areolate, first finger shorter than second) are as small as *E. walkeri*. Of the Group II species, only *E. carvalhoi* (northwestern Brazil and adjacent Colombia) and *E. croceoinguinis* (eastern Ecuador and adjacent Peru) are likely to be confused with *E. walkeri*. These three species have bright color patches in the groin (yellow in *carvalhoi* and *walkeri*, orange in *croceoinguinis*). The bright spots are irregular in shape and number in *walkeri* (Fig. 2), two are found on each side in *croceoinguinis* (one on the flank and one on the anterior thigh—both round), and one on the flank (round) in *carvalhoi*. The tympana are concealed in *carvalhoi* and *croceoinguinis* and neither species exhibits pattern polymorphism as in *walkeri*.

E. trachyblepharis (Boulenger) resembles *E. walkeri* in having visible tympana but lacks bright color patches on the concealed surfaces and does not exhibit pattern polymorphism. *E. trachyblepharis* has narrower digital pads and is slightly smaller than *E. walkeri*; *E. trachyblepharis* is currently known only from the Pastaza valley on the Amazonian versant of the Ecuadorian Andes. *E. martiae* Lynch, from the Amazon basin in Ecuador, resembles *E. walkeri* in size, structure of the hands and feet, and in exhibiting a similar pattern polymorphism. Unlike *E. walkeri*, *E. martiae* has a short, rounded snout, lacks color patches in the groin, does not have visible prevomerine odontophores,

and has a concealed tympanum. The several other dwarf *Eleutherodactylus* known from northwestern South America will not be confused with *E. walkeri*. *E. acuminatus* Shreve has a protruding snout and concealed tympana; *E. diastema* (Cope) and *E. moro* Savage have short, fringed digits; *E. gularis* (Boulenger) has short, fringed digits and papillae at the tips of the digits (as in *E. areolatus*, see Lynch, 1971); *E. paululus* Lynch has a protruding snout and is much smaller; and *E. pseudoacuminatus* Shreve has a truncate snout and concealed pre-vomerine odontophores. None of these species has yellow spotting in the groin or on the concealed limbs and none is polymorphic in color pattern.

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LITERATURE CITED

- COCHRAN, D. M. AND C. J. GOIN. 1970. Frogs of Colombia. Bull. U. S. Nat. Mus., 288:1-655.
- LYNCH, J. D. 1968. Two new frogs of the genus *Eleutherodactylus* from eastern Ecuador (Amphibia: Leptodactylidae). J. Herpetol., 2:129-35.
- . 1971. Redescriptions of three little-known *Eleutherodactylus* from northwestern Ecuador (Amphibia: Leptodactylidae). Trans. Kansas Acad. Sci., 73:169-80.

